MASSACHUSETTS INSTITUTE OF TECHNOLOGY
DEPARTMENT OF AERONAUTICS AND ASTRONAUTICS
INSTRUMENTATION LABORATORY FIELD SITE
ATLANTIC MISSILE RANGE

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TO: J. Tadich, KB63

FROM: George L. Silver

SUBJECT: LM PGNS Turn on Sequence

Preservation of the LM PGNS accelerometer loop stability is important to fulfilling mission objectives and/or history time lines. One important step in assuring stability is the proper prime power turn on sequence to assure that temperature and suspension requirements are met during turn on of the PGNS in the laboratory or spacecraft.

The proper turn on sequences are listed below with reasoning given in the following paragraphs.

1. IMU Heater Power "ON"

2. LGC Power "ON"

3. IMU Operate power "ON" after at least 15 minutes delay from IMU standby "ON" time. (See paragraph B below for 2 hour standby consideration)

   A. The accelerometer loops used in LM PGNS are designed and adjusted to operate at a temperature of 130.5°F. The portable temperature controllers (PTC) used with the Block II IMU uses the accelerometer temperature sensors for control of the stable member temperature and the IR1G sensors for indication of stable member temperature. The temperature set procedure and alarm set points of the PTC allows stable member storage temperature to be set in the ranges approximately 130°F to 140°F as indicated by the IR1G sensors. Nominaly the IR1G indicated temperature will be approximately 134 - 135°F, however, since the accelerometer temperature and IR1G temperature is padded to track each other the accelerometers are necessarily warmer than operate temperature.

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A. If the accelerometers are placed in the operate mode, which occurs at IMU OPERATE + 90 seconds, the initial magnetic state of the accelerometer torquer differs from that state which would occur at a nominal temperature turn on. The result is a scale factor offset which will diminish with operating time but will not equal the nominal scale factor unless the Torquer current is removed and reapplied at the nominal temperature. However, the IMU temperature circuity will generally stabilize the accelerometer temperature to 130.5 + .5°F within 15 minutes of application of IMU standby power if storage temperatures were within the storage ranges. The 15 minute time delay should not add serial time to turn on sequence since the LGC turn on sequence and tests will normally require at least 15 minutes to accomplish using ACE.

B. The time period between IMU HTR PWR/LGC power and IMU OPERATE power is determined as follows:

If the IMU has been parked less than 5 days after the last operating period and has not been moved since shutdown, then IMU OPERATE power may be applied 15 minutes after IMU HTR power with no time constraint between LGC power and IMU OPERATE power. However; if the IMU has been moved, parked longer than 5 days or turned off in an unparked orientation for periods longer than 2 hours*, the time between LGC power on (3200~) and IMU OPERATE must be 2 hours minimum to allow proper axial suspension of the accelerometers.

* If the system is turned off in an unparked orientation for periods exceeding 15 minutes the suspension time should equal the off time ---- need not exceed two hours.

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